TOSHIBA

UNINTERRUPTIBLE POWER SYSTEM

SINGLE PHASE - .6/.8/1.0/1.2/1.5/2.0/2.4 kVA
SINGLE PHASE - .6/.8/1.0/1.5 kVA PLUS

1400SE and 1400SE PLUS SERIES

including 1400RE SERIES

MANUFACTURED IN THE U.S.A.

OPERATION MANUAL

March, 2003
Part #44470-004

NOTE

The instructions contained in this manual are not intended to cover all of the details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Toshiba sales office.

The contents of this instruction manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation's UPS Division. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation's UPS Division and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment, without prior written consent of Toshiba International Corporation, will void all warranties and may void UL listing and/or CSA certification. Unauthorized modifications also can result in personal injury, death, or destruction of the equipment.

UNINTERRUPTIBLE POWER SUPPLY

If additional information or technical assistance is required call Toshiba's marketing department toll free at (800) 231-1412 or write to: Toshiba International Corporation, 13131 W. Little York Road, Houston, TX 77041-9990.

Please complete the following information for your records and to remain within this equipment manual:

Model Number: _____

Serial Number: _____

Date of Installation: _____

Inspected By: _____

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INTRODUCTION

Thank you for purchasing the 1400SE/1400SE Plus Series UPS. This Series features the very latest state of the art microprocessor technology and also uses IGBT transistors for fast, high power and low noise PWM (pulse width modulation) switching. Also, the Plus Series features a low impedence output transformer to provide isolation even during bypass operation.

It is the intent of this manual to provide a guide for ***safely*** installing, operating, and maintaining the UPS. This operation manual contains a section of general safety instructions and is marked throughout with warning symbols. ***Read this operation manual*** thoroughly before installation and operation of this electrical equipment.

All safety warnings must be followed to ensure personal safety.

Follow all precautions to attain proper equipment performance and longevity.

General safety instructions are found on page v and important safety instructions are found on pages vi and vii. Read and save these instructions for future reference.

The manual is divided into major sections of interest. Section 1 contains the product description with the theory of operation and applications. All of the initial inspection, storage, installation, operating, and prestart precautions can be found in Sections 2 and 3.

Section 4 contains the equipment standard specifications.

Section 5 outlines the operating modes, protective features, battery recharging, battery low voltage tolerances, alarm and panel indicator functions.

Section 6 shows the control interface pin configurations.

Sections 7 and 8 are devoted to troubleshooting procedures, preventative maintenance techniques and periodic parts replacement. A fuse rating chart is also shown.

Section 9 shows front, rear, and side panel layout views with dimensional data. Labels, connector and switch placement, and shipping weights are also shown.

We hope that you find this operation manual informative and easy to use. If additional information or technical assistance is needed, please call toll free (800) 231-1412 or write to: Toshiba International Corporation, 13131 W. Little York Road, Houston, TX 77041-9990.

Again, thank you for the purchase of this product.

TOSHIBA INTERNATIONAL CORPORATION

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GENERAL SAFETY INSTRUCTIONS

Warnings in this manual appear in any of four ways:

1) *Danger* - The danger symbol is a lightning bolt mark enclosed in a triangle which precedes the 3/16" high letters spelling the word "DANGER". The danger symbol is used to indicate imminently hazardous situations, locations, and conditions which, if not avoided, **WILL** result in death, serious injury, and/or severe property damage.

DANGER

2) *Warning* - The warning symbol is an exclamation mark enclosed in a triangle which precedes the 3/16" high letters spelling the word "WARNING". The warning symbol is used to indicate potentially hazardous situations and conditions which, if not avoided **COULD** result in serious injury or death. Severe property damage **COULD** also occur.

WARNING

3) *Caution* - The caution symbol is an exclamation mark enclosed in a triangle which precedes the 3/16" high letters spelling the word "CAUTION". The caution symbol is used to indicate potentially hazardous situations and conditions which, if not avoided may result in injury. Equipment damage may also occur.

CAUTION

4) *Attention warnings* - The attention warning symbol is an exclamation mark enclosed in a triangle which precedes the 3/16" high letters spelling the word "ATTENTION". The Attention warning symbol is used to indicate situations and conditions that can cause operator injury and/or equipment damage:

ATTENTION

Other warning symbols may appear along with the *Danger* and *Caution* symbol and are used to specify special hazards. These warnings describe particular areas where special care and/or procedures are required in order to prevent serious injury and possible death:

1) *Electrical warnings* - The electrical warning symbol is a lighting bolt mark enclosed in a triangle. The Electrical warning symbol is used to indicate high voltage locations and conditions that may cause serious injury or death if the proper precautions are not observed:

2) *Explosion warnings* - The explosion warning symbol is an explosion mark enclosed in a triangle. The Explosion warning symbol is used to indicate locations and conditions where molten, exploding parts may cause serious injury or death if the proper precautions are not observed:

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS- This manual contains important instructions that should be followed during the installation and maintenance of the UPS and it's batteries. Use for models UC1A1A006C6TB, UC1A1A006C6B, UC1A1A008C6TB, UC1AIA008C6B, UC1A1A010C6B, UC1A1A010C6TB, UC1A1A012C6B, UC1A1A015C6B, UC1A1A015C6TB, UC1A1A020C6B, UC1A1A024C6B, UC1A1A015C6RKB, UC1A1A015C6RKPB, and UC1A1A020C6RKB

- The maximum ambient temperature in which this UPS unit should be operated or stored is 104 deg F (40 deg C).

- The nominal battery voltage range is indicated in Section 5.6 on page 5-7.

- Servicing of the batteries should only be performed by a qualified Toshiba Representative who is knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

- When replacing batteries, use the same number and type of one of the following sealed, lead-acid batteries (do not mix types of batteries):

Model Capacity	Manufacturer	Type	Quantity
600 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	3 3
800 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	4 4
1000 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	4 4
1200 VA	Panasonic Yuasa	LC 12V7.2PI NP7 - 12FR	5 5
1500 VA and UC1A1A020C6RKB	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	6 6
2000 and 2400 VA (except UC1A1A020C6RKB)	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	8 8

CAUTION Misuse of this equipment could result in human injury and equipment damage. In no event will Toshiba Corporation be responsible or liable for either indirect or consequential damage or injury that may result from the use of this equipment.

CAUTION Do not dispose of the batteries in a fire. The batteries may explode.

CAUTION Do not open or mutilate the batteries. Released electrolyte is harmful to the eyes and skin and could also be toxic.

WARNING This unit contains sealed lead acid batteries. Lack of preventative maintenance could result in batteries exploding and emitting gasses and/or flame. Annual preventative maintenance must be performed by an authorized, trained technician.

WARNING Failure to replace a battery before it becomes exhausted may cause the case to crack, possibly releasing electrolytes from inside the battery, and resulting in secondary faults such as odor, smoke, and fire.

IMPORTANT SAFETY INSTRUCTIONS

WARNING Installation and servicing of batteries should be performed by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from the batteries.

WARNING Proper maintenance to the battery system of this unit must be done by a qualified service technician, this is essential to the safety and reliability of your UPS system. Refer to service manual.

DANGER ***A battery can present a risk of electrical shock and high short circuit current.*** The following precautions should be observed when working with batteries:

1) Verify that the UPS is off and that the power cord is disconnected from the power source.
2) Remove watches, rings or other metal objects.
3) Use tools with insulated handles to prevent inadvertent shorts.
4) Wear rubber gloves and boots.
5) Do not lay tools or metal parts on top of batteries.
6) Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source of ground. ***Contact with any part of a grounded battery can result in electrical shock.*** The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.
7) Verify circuit polarities prior to making connections.
8) Disconnect charging source and load prior to connecting or disconnecting terminals.
9) VRLA batteries contain an explosive mixture of hydrogen gas. Do not smoke, cause a flame or spark in the immediate area of the batteries. This includes static electricity from the body.
10) Do not attempt to open the batteries in order to add water or sample the specific gravity of the electrolyte. The batteries are valve regulated lead acid type and such servicing is not possible without damaging the battery.
11) Use proper lifting means when moving batteries and wear all appropriate safety clothing and equipment.
12) Do not dispose of lead acid batteries except through channels in accordance with local, state and federal regulations.

INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ

CONSERVER CES INSTRUCTIONS

Cette notice contient des instructions importantes concernant la sécurité.

ATTENTION Une battery peut présenter un risque de choc électrique, de brûlure par transfert d' énergie.

ATTENTION Pour le remplacement, utiliser le même nombre de batteries du modéle suivant.

Model Capacity	Manufacturer	Type	Quantity
600 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	3 3
800 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	4 4
1000 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	4 4
1200 VA	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	5 5
1500 VA and UC1A1A020C6RKB	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	6 6
2000 and 2400 VA (except UC1A1A020C6RKB)	Panasonic Yuasa	LCV 12V7.2PI NP7 - 12FR	8 8

ATTENTION L' élimination des batteries est règlementèe. Consulter les codes locaux à cet effet.

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1.0 Product Description

1.1 Theory of Operation

An uninterruptible power supply is a system that is installed between the commercial power and the load equipment. It is used during short-term blackouts or brownouts. The UPS provides steady ac output power during these commercial power interruptions. This power is provided for a long enough time so that the load can be shutdown in an orderly fashion. This prevents loss of data and possible damage to both hardware and software.

During normal operation the UPS uses commercial ac power. In addition, it also takes in all of the high voltage spikes and transients caused by switching and faults, and all of the common mode and normal mode noise which is associated with commercial ac power. The UPS converts it all to flat dc power. From this dc power, the UPS charges its batteries and generates its own extremely high quality ac waveform output. The result of this process is maximum power conditioning.

If the ac power supplied to the UPS drops below a specified voltage level, the unit's batteries automatically begin supplying power instead of receiving it. This insures that the loads connected to the UPS continue to receive power with no interruption. When ac input power becomes available again, operation returns to normal. The unit's batteries begin to recharge so they will be ready for the next power interruption.

1.2 Application and Use

Toshiba's 1400SE and 1400SE Plus Series of on-line uninterruptible power supply (UPS) systems provide continuous computer-grade ac power in a compact, high performance, and energy efficient unit. The UPS unit assures safe and reliable operation of critical office equipment. This can range from word processors and personal computers to mini-computers and local area networks. All units feature an audible alarm which sounds if the battery voltage drops below standard during use. This is an additional aid to help in retaining the valuable office data banks. All units allow for computer interfacing and an external battery pack option (see specifications).

1.3 Power Backup

When an electrical power failure occurs, the UPS unit's internal maintenance-free batteries automatically supply back-up power to the load without interruption. For example, when used to support a computer, the UPS back-up assures enough additional time to complete the activity and store data. This allows an orderly shutdown after a power failure has occurred.

1.4 Power Conditioning

When commercial power is present, the UPS supplies conditioned power to the load while maintaining its batteries in a charged condition. The UPS protects against the normal everyday problems associated with heavy use of raw commercial ac power, including power sags, surges, signal interference, and spikes. This protection keeps power-line problems from reaching the loads where they can cause equipment to operate erratically, hard-disk crashes, or cause damage to hardware and software.

2.0 Inspection/Storage/Disposal

2.1 Inspection of the new UPS equipment

Upon receipt of the UPS, a careful inspection for shipping damage should be made.

After Uncrating:

1) Check the unit for loose, broken, bent or otherwise damaged parts. If damage has occurred during shipment, keep all original crating and packing materials for return to shipping agent. Warranty will not apply to units which are damaged during shipment.

2) Check to see that the rated capacity and the model number specified on the nameplate conform to the order specifications.

2.2 Storage of UPS equipment.

If the UPS equipment is to be subject to long or short term storage the following guidelines should be used.

Avoid:

1) Storage in sites subject to extreme changes in temperature or high humidity.

2) Storage in sites subject to exposure of high levels of dust or metal particles

3) Storage on inclined floor surfaces or in sites subject to excessive vibration.

Before storing:

1) Charge the units batteries.

2) Place the STOP/RUN switch in the STOP position.

Storing:

1) Store within a temperature range of -20° to 40° C (-4° to 104° F).

2) For best results, store the UPS in the original shipping container and place on a wood or metal pallet.

3) The optimum storage temperature is 21° C (70° F). Higher ambient temperatures cause UPS batteries to need recharging more frequently.

After storing:

1) If stored in an ambient temperature under 20° C (68° F); recharge the batteries every 9 months.

2) If stored in an ambient temperature of 20° to 30° C (68° to 86° F); recharge the batteries every 6 months.

3) If stored in an ambient temperature of 30° to 40° C (86° to 104° F); recharge the batteries every 3 months.

2.3 Disposal

Please contact your state environmental agency for details on disposal of electrical components and packaging in your particular area.

It is illegal to dump lead-acid batteries in landfills or to dispose of them improperly. Please help our Earth by contacting the environmental protection agencies in your area, the battery manufacturer, or call Toshiba toll-free at (800) 231-1412 for more information about recycling.

3.0 Precautions

3.1 Installation Precautions (General) ⚠ CAUTION

1) Install the unit in a well ventilated location; allow at least 10 cm (4 inches) on all sides for air ventilation and for maintenance.

2) Install the unit in a stable, level, and upright position which is free of vibration.

3) Install the unit where the ambient temperature is within the correct operating range (see Specifications Section 4.0).

4) Do not install the UPS in areas that are subject to high humidity.

5) Do not allow direct sunlight to shine on the unit.

6) Do not install the UPS in areas which are subject to contamination such as high levels of airborne dust, metal particles, or inflammable gas.

7) Avoid installation near sources of electrical noise and always make sure that the unit ground is intact to prevent electrical shock and to help reduce electrical noise.

8) Do not install where water or any foreign object may get inside the UPS.

9) This UPS generates and can radiate radio-frequency energy during operation. Although RFI noise filters are installed inside the unit there is no guarantee that the UPS will not influence some sensitive devices which are operating close by. If such interference is experienced, the UPS should be installed farther away from the effected equipment and/or powered from a different source than that of the affected equipment.

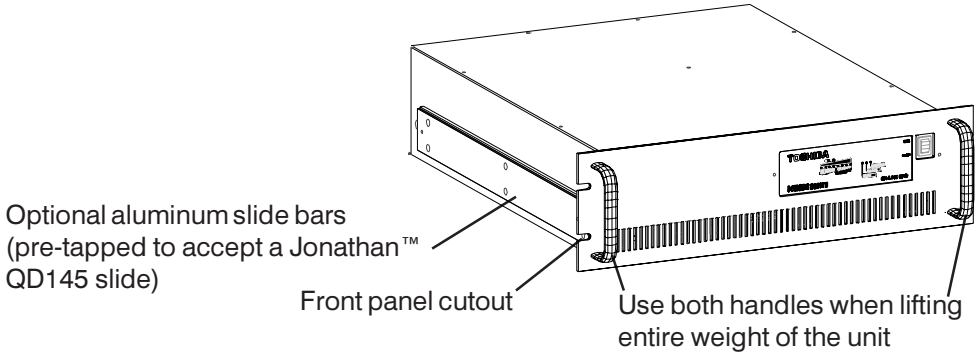
3.2 Installation Precautions (Rack mounted) ⚠ CAUTION

1) Install the UPS in a conventional rack-style structure. If attaching Jonathan™ QD 145 slides, optional pre-tapped aluminum slide bars are available. The optional aluminum slide bars may be attached to the sides of the unit as shown (see detail below). The rack must be bolted to the floor, secured permanently to a wall, or otherwise secured to prevent toppling.

2) Allow at least 4 inches of open space in the front of the unit for proper ventilation.

3) Allow at least 30 inches of open space at the rear of the unit for operation of disconnect devices.

4) Use an appropriate mechanical lifting device when moving this unit into or out of the rack structure.


Optional aluminum slide bars
(pre-tapped to accept a Jonathan™
QD145 slide)
Front panel cutout
Use both handles when lifting
entire weight of the unit

3.0 Precautions

3.3 Prestart Precautions

CAUTION

1) Before connecting the UPS to a power source; move the operation switch (STOP/RUN), on the front panel (See sections 9.1 through 9.3), to the STOP position.

3.4 Operating Precautions

CAUTION

1) The UPS should not be powered up until the entire operation manual has been reviewed.

2) The input power source voltage and frequency must be within the specified ranges (See Specification sections 4.1 through 4.3). Voltages and frequencies outside of the permissible tolerance ranges may cause internal protection devices to activate.

3) The UPS should not be used with a load whose rated input is greater than the rated UPS output.

4) Do not use the UPS to provide power to motors that require high starting current or a long starting time such as vacuum cleaners and machine tools (oversizing for lock rotor current required).

5) Do not insert metal objects or combustible materials in the unit's ventilation slots.

6) Do not place, hang, or paste any objects on the top or on the exterior surfaces of the UPS.

7) Always use caution when connecting or disconnecting load equipment. ***The UPS may be supplying power to the output load receptacles through the bypass circuit.*** This can occur when the STOP/RUN switch is in the STOP position and the unit is connected to a source of supply power (see Circuit-bypass Mode section 5.1.3).

4.0 Specifications

4.1 Standard Series Specifications

	MODEL NUMBER	UC1A1A006C6B	UC1A1A008C6B	UC1A1A010C6B
	CAPACITY	600 VA (0.42 kW)	800 VA (0.56 kW)	1000 VA (0.7 kW)
Input	Input voltage	Single phase, 120 Vac, +10% to -30% (*)		
	Input frequency	45 to 65 Hz		
	Input capacity	600 VA	800 VA	1000 VA
	Input power factor	Approximate unity (0.98 to 1.0)		
Battery	Battery rated voltage	36 Vdc	48 Vdc	48 Vdc
	Battery backup time when fully charged with 0.7 power factor at 77° F (25° C)	10 min. at full load (**) 30 min. at half load (**)	10 min. at full load (**) 30 min. at half load (**)	10 min. at full load (**) 30 min. at half load (**)
	Recharge time	Maximum 24 hrs to 100% (90% recharge after 8 hrs) (***)		
	Type of batteries	Sealed lead-acid		
Output	Output voltage	Single-phase, 120 volts		
	Output voltage regulation	Within +/- 3%, steady state		
	Output frequency	50/60 Hz +/- 0.5% in free-running mode (line sync range +/- 1Hz)		
	Output voltage waveform	Computer-grade sine wave with less than 3.0% total harmonic distortion with linear load		
	Rated load power factor	0.7 lagging (0.6 to 1.0)		
	Voltage transient characteristic	+/- 5% under 100% load step change		
	Rated output current (rms)	5.0A	6.7A	8.3A
	Maximum output current (peak)	15.0A	20.0A	25.0A
	Inverter overload capacity	150% for 60 seconds		
	Crest factor	3.0		
Environment	Operating temperature	32 to 104° F (0 to 40° C), optimal at 77° F (25° C)		
	Storage temperature	-4 to 104° F (-20 to 40° C)		
	Operating humidity	30 to 90%, no condensation		
	Altitude(****)	Less than 3000 ft (1000 m) above sea level		
	External dimensions	7.06W x 20.44D x 14.63H in (179W x 519D x 371H mm)		
	Net weight	60 lb (27.2 kg)	66 lb (29.9 kg)	70 lb (31.8 kg)
	Acoustical noise	45 dB at max. output, measured 3.3 ft (1 m) from front panel		
	Efficiency (ac-dc-ac)	85%	85%	87%
Switches	Bypass switch	Automatic bypass is provided when the run switch is in the off position, if a fault occurs, or if an overload occurs (transfer time is approximately 4 mS)		
Interfaces	IBM *(TM)* AS/400	Pins 5 through 9	DB9 male connector	
	LAN Manager	Pins 2 and 3		
	Fault detect and input power loss	Pins 1 and 4		
	RS232 ASCII	Pins 1 through 8	DB9 female connector (Pin 9 not used)	
Options	Software for unattended computer shutdown	Contact Toshiba for details on this option		
	External battery pack	Contact Toshiba for details on this option		

(*) Output capacity reduced when input voltage is between -15% and -30% of nominal.
(**) Battery backup time may vary depending on the operating conditions including ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is used for battery backup.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.

4.0 Specifications

4.1 Standard Series Specifications (Cont'd)

	MODEL NUMBER	UC1A1A012C6B	UC1A1A015C6B	UC1A1A020C6B
	CAPACITY	1200 VA (0.84 kW)	1500 VA (1.05 kW)	2000 VA (1.4 kW)
Input	Input voltage	Single phase, 120 Vac, +10% to -30% (*)		
	Input frequency	45 to 65 Hz		
	Input capacity	1200 VA	1500 VA	1920 VA
	Input power factor	Approximate unity (0.98 to 1.0)		
Battery	Battery rated voltage	48 Vdc	72 Vdc	96 Vdc
	Battery backup time when fully charged with 0.7 power factor at77° F (25° C)	10 min. at full load (**) 30 min. at half load (**)	10 min. at full load (**) 30 min. at half load (**)	10 min. at full load (**) 30 min. at half load (**)
	Recharge time	Maximum 24 hrs to 100% (90% recharge after 8 hrs) (***)		
	Type of batteries	Sealed lead-acid		
Output	Output voltage	Single-phase, 120 volts		
	Output voltage regulation	Within +/- 3%, steady state		
	Output frequency	50/60 Hz +/- 0.5% in free-running mode (line sync range +/- 1Hz)		
	Output voltage waveform	Computer-grade sine wave with less than 3.0% total harmonic distortion with linear load		
	Rated load power factor	0.7 lagging (0.6 to 1.0)		
	Voltage transient characteristic	+/- 5% under 100% load step change		
	Rated output current (rms)	10.0A	12.5A	16.7A
	Maximum output current (peak)	30.0A	37.5A	50.0A
	Inverter overload capacity	150% for 60 seconds		
	Crest factor	3.0		
Environment	Operating temperature	32 to 104° F (0 to 40° C), optimal at 77° F (25° C)		
	Storage temperature	-4 to 104° F (-20 to 40° C)		
	Operating humidity	30 to 90%, no condensation		
	Altitude(****)	Less than 3000 ft (1000 m) above sea level		
	External dimensions (1.2 KVA)	7.06W x 20.44D x 14.63H in (179W x 519D x 371H mm)		
	External dimensions (1.5 - 2 KVA)	7.06W x 23.16D x 14.63H in (179W x 588D x 371H mm)		
	Net weight	76 lb (34.5 kg)	96 lb (43.6 kg)	106 lb (48.2 kg)
	Acoustical noise	45 dB at max. output, measured 3.3 ft (1 m) from front panel		
	Efficiency (ac-dc-ac)	87%	87%	87%
Switches	Bypass switch	Automatic bypass is provided when the run switch is in the off position, if a fault occurs, or if an overload occurs (transfer time is approximately 4 mS)		
Interfaces	IBM *(TM)* AS/400	Pins 5 through 9	DB9 male connector	
	LAN Manager	Pins 2 and 3		
	Fault detect and input power loss	Pins 1 and 4		
	RS232 ASCII	Pins 1 through 8	DB9 female connector (Pin 9 not used)	
Options	Software for unattended computer shutdown	Contact Toshiba for details on this option		
	External battery pack	Contact Toshiba for details on this option		

(*) Output capacity reduced when input voltage is between -15% and -30% of nominal.
(**) Battery backup time may vary depending on the operating conditions including ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is used for battery backup.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.

4.0 Specifications

4.1 Standard Series Specifications (Cont'd)

	MODEL NUMBER	UC1A1A024C6B	
	CAPACITY	2400 VA (1.68 kW)	
Input	Input voltage	Single phase, 120 Vac, +10% to -30% (*)	
	Input frequency	45 to 65 Hz	
	Input capacity	2400 VA	
	Input power factor	Approximate unity (0.98 to 1.0)	
Battery	Battery rated voltage	96 Vdc	
	Battery backup time when fully charged with 0.7 power factor at77° F (25° C)	7 min. at full load (**) 21 min. at half load (**)	
	Recharge time	Maximum 24 hrs to 100% (90% recharge after 8 hrs) (***)	
	Type of batteries	Sealed lead-acid	
Output	Output voltage	Single-phase, 120 volts	
	Output voltage regulation	Within +/- 3%, steady state	
	Output frequency	50/60 Hz +/- 0.5% in free-running mode (line sync range +/- 1Hz)	
	Output voltage waveform	Computer-grade sine wave with less than 3.0% total harmonic distortion with linear load	
	Rated load power factor	0.7 lagging (0.6 to 1.0)	
	Voltage transient characteristic	+/- 5% under 100% load step change	
	Rated output current (rms)	20.0A	
	Maximum output current (peak)	60.0A	
	Inverter overload capacity	150% for 60 seconds	
	Crest factor	3.0	
Environment	Operating temperature	32 to 104° F (0 to 40° C), optimal at 77° F (25° C)	
	Storage temperature	-4 to 104° F (-20 to 40° C)	
	Operating humidity	30 to 90%, no condensation	
	Altitude(****)	Less than 3000 ft (1000 m) above sea level	
	External dimensions	7.06W x 23.16D x 14.63H in (179W x 588D x 371H mm)	
	Net weight	106 lb (48.2 kg)	
	Acoustical noise	45 dB at max. output, measured 3.3 ft (1 m) from front panel	
	Efficiency (ac-dc-ac)	87%	
Switches	Bypass switch	Automatic bypass is provided when the run switch is in the off position, if a fault occurs, or if an overload occurs (transfer time is approximately 4 mS)	
Interfaces	IBM *(TM)* AS/400	Pins 5 through 9	DB9 male connector
	LAN Manager	Pins 2 and 3	
	Fault detect and input power loss	Pins 1 and 4	
	RS232 ASCII	Pins 1 through 8	DB9 female connector (Pin 9 not used)
Options	Software for unattended computer shutdown	Contact Toshiba for details on this option	
	External battery pack	Contact Toshiba for details on this option	

(*) Output capacity reduced when input voltage is between -15% and -30% of nominal.
(**) Battery backup time may vary depending on the operating conditions including ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is used for battery backup.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.

4.0 Specifications

4.2 Plus Series Specifications (w/output isolation transformer)

	MODEL NUMBER	UC1A1A006C6TB	UC1A1A008C6TB	UC1A1A010C6TB
	CAPACITY	600 VA (0.42 kW)	800 VA (0.56 kW)	1000 VA (0.7 kW)
Input	Input voltage	Single phase, 120 Vac, +10% to -30% (*)		
	Input frequency	45 to 65 Hz		
	Input capacity	600 VA	800 VA	1000 VA
	Input power factor	Approximate unity (0.98 to 1.0)		
Battery	Battery rated voltage	36 Vdc	48 Vdc	48 Vdc
	Battery backup time when fully charged with 0.7 power factor at 77° F (25° C)	10 min. at full load (**) 30 min. at half load (**)	10 min. at full load (**) 30 min. at half load (**)	10 min. at full load (**) 30 min. at half load (**)
	Recharge time	Maximum 24 hrs to 100% (90% recharge after 8 hrs) (***)		
	Type of batteries	Sealed lead-acid		
Output	Output voltage	Single-phase, 120 volts		
	Output voltage regulation	Within +/- 3%, steady state		
	Output frequency(*****)	50/60 Hz +/- 0.5% in free-running mode (line sync range +/- 1Hz)		
	Output voltage waveform	Computer-grade sine wave with less than 3.0% total harmonic distortion with linear load		
	Common mode	Less than 0.5V peak		
	Normal mode	Less than 10V peak		
	Rated load power factor	0.7 lagging (0.6 to 1.0)		
	Voltage transient characteristic	+/- 5% under 100% load step change		
	Rated output current (rms)	5.0A	6.7A	8.3A
	Maximum output current (peak)	15.0A	20.0A	25.0A
	Inverter overload capacity	150% for 60 seconds		
	Crest factor	3.0		
Environment	Operating temperature	32 to 104° F (0 to 40° C), optimal at 77° F (25° C)		
	Storage temperature	-4 to 104° F (-20 to 40° C)		
	Operating humidity	30 to 90%, no condensation		
	Altitude(****)	Less than 3000 ft (1000 m) above sea level		
	External dimensions	7.06W x 20.44D x 14.63H in (179W x 519D x 371H mm)		
	Net weight	80 lb (36.4 kg)	85 lb (38.6 kg)	92 lb (41.8 kg)
	Acoustical noise	45 dB at max. output, measured 3.3 ft (1 m) from front panel		
	Efficiency (ac-dc-ac)	83%	83%	85%
Switches	Bypass switch	Automatic bypass is provided when the run switch is in the off position, if a fault occurs, or if an overload occurs (transfer time is approximately 4 mS)		
Interfaces	IBM *(TM)* AS/400	Pins 5 through 9	DB9 male connector	
	LAN Manager	Pins 2 and 3		
	Fault detect and input power loss	Pins 1 and 4		
	RS232 ASCII	Pins 1 through 8	DB9 female connector (Pin 9 not used)	
Options	Software for unattended			
	computer shutdown	Contact Toshiba for details on this option		
	External battery pack	Contact Toshiba for details on this option		

(*) Output capacity reduced when input voltage is between -15% and -30% of nominal.
(**) Battery backup time may vary depending on the operating conditions including ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is used for battery backup.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.
(*****) Output voltage and capacity derated for 50 Hz output (model # UC1A1A010C6TB only).

4.0 Specifications

4.2 Plus Series Specifications (w/output isolation transformer) (Cont'd)

	MODEL NUMBER	UC1A1A015C6TB	
	CAPACITY	1500 VA (1.05 kW)	
Input	Input voltage	Single phase, 120 Vac, +10% to -30% (*)	
	Input frequency	45 to 65 Hz	
	Input capacity	1500 VA	
	Input power factor	Approximate unity (0.98 to 1.0)	
Battery	Battery rated voltage	72 Vdc	
	Battery backup time when fully charged with 0.7 power factor at 77° F (25° C)	10 mins. at full load (**) 30 mins. at half load (**)	
	Recharge time	Maximum 24 hrs to 100% (90% recharge after 8 hrs) (***)	
	Type of batteries	Sealed lead-acid	
Output	Output voltage	Single-phase, 120 volts	
	Output voltage regulation	Within than +/- 3%, steady state	
	Output frequency*****	50/60 Hz +/- 0.5% in free-running mode (line sync range +/- 1Hz)	
	Output voltage waveform	Computer-grade sine wave with less than 3.0% total harmonic distortion with linear load	
	Common mode	Less than 0.5V peak	
	Normal mode	Less than 10V peak	
	Rated load power factor	0.7 lagging (0.6 to 1.0)	
	Voltage transient characteristic	+/- 5% under 100% load step change	
	Rated output current (rms)	12.5A	
	Maximum output current (peak)	37.5A	
	Inverter overload capacity	150% for 60 seconds	
	Crest factor	3.0	
Environment	Operating temperature	32 to 104° F (0 to 40° C), optimal at 77° F (25° C)	
	Storage temperature	-4 to 104° F (-20 to 40° C)	
	Operating humidity	30 to 90%, no condensation	
	Altitude(****)	Less than 3000 ft (1000 m) above sea level	
	External dimensions	7.06W x 23.16D x 14.63H in (179W x 588D x 371H mm)	
	Net weight	117 lb (53.2 kg)	
	Acoustical noise	45 dB at max. output, measured 3.3 ft (1 m) from front panel	
	Efficiency (ac-dc-ac)	85%	
Switches	Bypass switch	Automatic bypass is provided when the run switch is in the off position, if a fault occurs, or if an overload occurs (transfer time is approximately 4 mS)	
Interface	IBM *(TM)* AS/400	Pins 5 through 9	DB9 male connector
	LAN Manager	Pins 2 and 3	
	Fault detect and input power loss	Pins 1 and 4	
	RS232 ASCII	Pins 1 through 8	DB9 female connector (Pin 9 not used)
Options	Software for unattended computer shutdown	Contact Toshiba for details on this option	
	External battery pack	Contact Toshiba for details on this option	

(*) Output capacity reduced when input voltage is between -15% and -30% of nominal.
(**) Battery backup time may vary depending on the operating conditions including ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is used for battery backup.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.
(*****) Output voltage and capacity derated for 50 Hz output.

4.0 Specifications

4.3 Standard Series Specifications (Rack mounted)

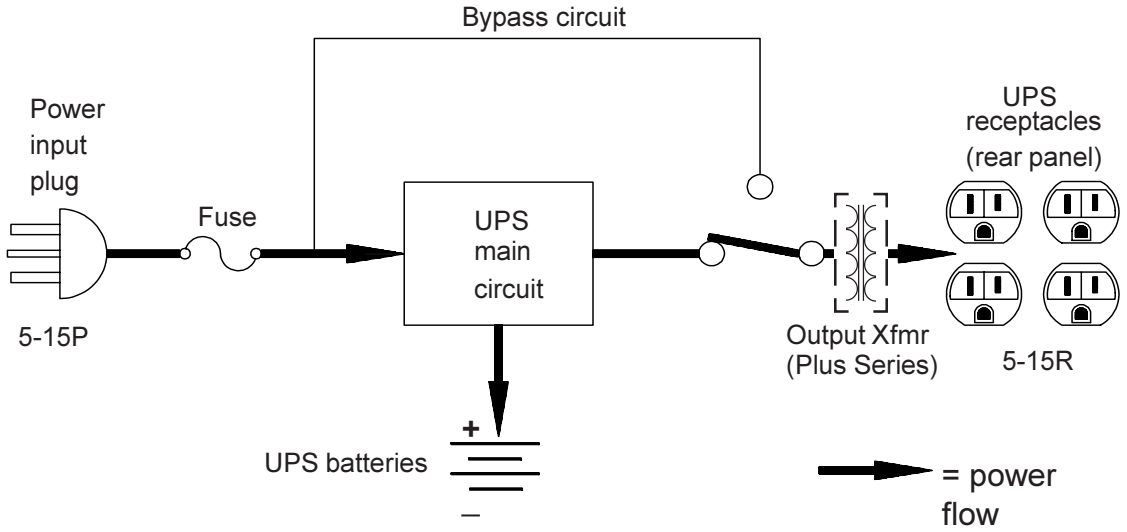
	MODEL NUMBER	UC1A1A015C6RKB	UC1A1A020C6RKB	
	CAPACITY	1500 VA (1.05 kW)	2000 VA (1.4 kW)	
Input	Input voltage	Single phase, 120 Vac, +10% to -30% (*)		
	Input frequency	45 to 65 Hz		
	Input capacity	1500 VA	1920 VA	
	Input power factor	Approximate unity (0.98 to 1.0)		
Battery	Battery rated voltage	72 Vdc	72 Vdc	
	Battery backup time when fully charged with 0.7 power factor at 77° F (25° C)	10 mins. at full load (**) 30 mins. at half load (**)	7 mins. at full load (**) 21 mins. at half load (**)	
	Recharge time	Maximum 24 hrs to 100% (90% recharge after 8 hrs) (***)		
	Type of batteries	Sealed lead-acid		
Output	Output voltage	Single-phase, 120 volts		
	Output voltage regulation	Within than +/- 3%, steady state		
	Output frequency	50/60 Hz +/- 0.5% in free-running mode (line sync range +/- 1Hz)		
	Output voltage waveform	Computer-grade sine wave with less than 3.0% total harmonic distortion with linear load		
	Rated load power factor	0.7 lagging (0.6 to 1.0)		
	Voltage transient characteristic	+/- 5% under 100% load step change		
	Rated output current (rms)	12.5A	16.7A	
	Maximum output current (peak)	37.5A	50.0A	
	Inverter overload capacity	150% for 60 seconds		
	Crest factor	3.0		
Environment	Operating temperature	32 to 104° F (0 to 40° C), optimal at 77° F (25° C)		
	Storage temperature	-4 to 104° F (-20 to 40° C)		
	Operating humidity	30 to 90%, no condensation		
	Altitude(****)	Less than 3000 ft (1000 m) above sea level		
	Overall dimensions	19W x 20D x 5.25H in (482W x 508D x 133H mm)		
	Net weight	81 lb (36.8 kg)	81 lb (36.8 kg)	
	Acoustical noise	45 dB at max. output, measured 3.3 ft (1 m) from front panel		
	Efficiency (ac-dc-ac)	87%	87%	
Switches	Bypass switch	Automatic bypass is provided when the run switch is in the off position, if a fault occurs, or if an overload occurs (transfer time is approximately 4 mS)		
Interface	IBM *(TM)* AS/400	Pins 5 through 9	DB9 male connector	
	LAN Manager	Pins 2 and 3		
	Fault detect and input power loss	Pins 1 and 4		
	RS232 ASCII	Pins 1 through 8	DB9 female connector (Pin 9 not used)	
Options	Software for unattended computer shutdown	Contact Toshiba for details on this option		
	External battery pack	Contact Toshiba for details on this option		

(*) Output capacity reduced when input voltage is between -15% and -30% of nominal.
(**) Battery backup time may vary depending on the operating conditions including ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is used for battery backup.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.

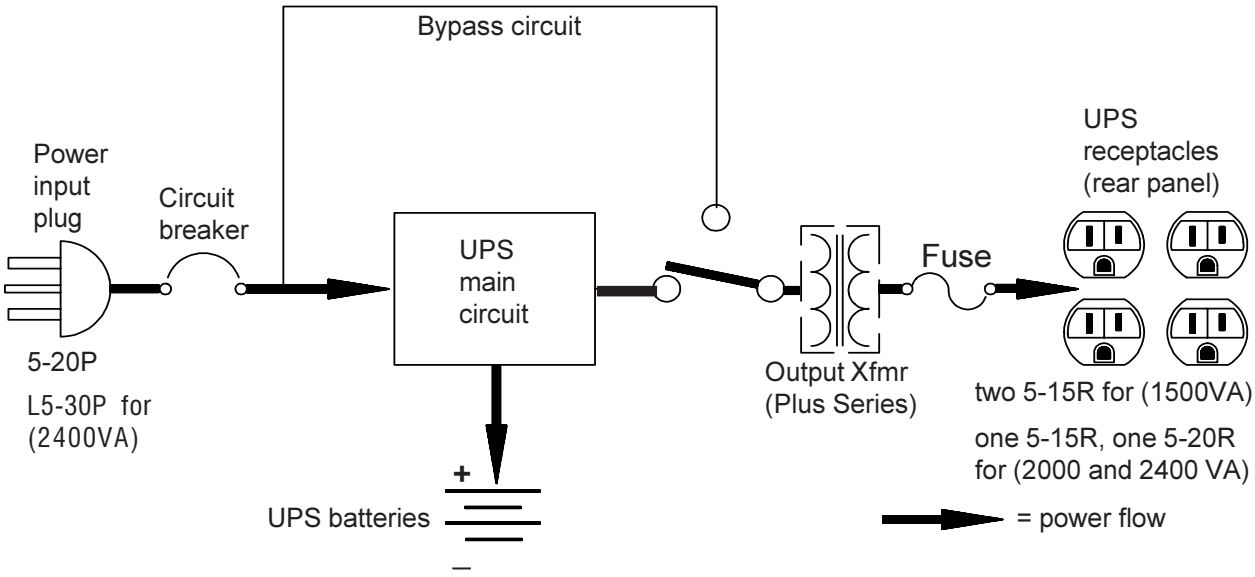
5.0 Operating the UPS

5.1 Operation Modes

5.1.1 AC Input Mode (normal operation)



Power flow in AC input mode for 600, 800, 1000, and 1200 VA Models



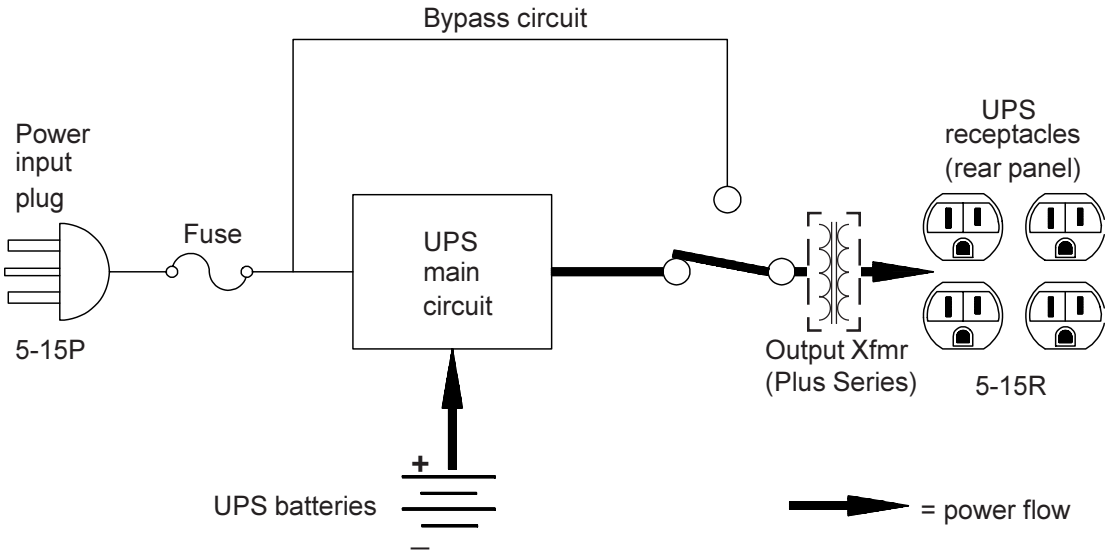
Power flow in AC input mode for 1500, 2000, and 2400 VA Models

Both of the above illustrations show circuit power flow in the ac input mode. The UPS unit's rectifier, included in a boost chopper circuit, converts ac input power to dc power. This dc power runs the unit's transistor inverter and charges the batteries. The boost chopper circuit maintains a constant voltage, with current limiting, for charging the batteries and assures proper sine waveform generation for the output current. The unit's batteries are maintained in a constantly charged state when the UPS is in the normal operation mode.
On the front panel, LED's labeled "AC LINE" and "INVERTER" should be on and the "FAULT" LED should be off (See Section 9.5 or 9.6 Panel Layout).

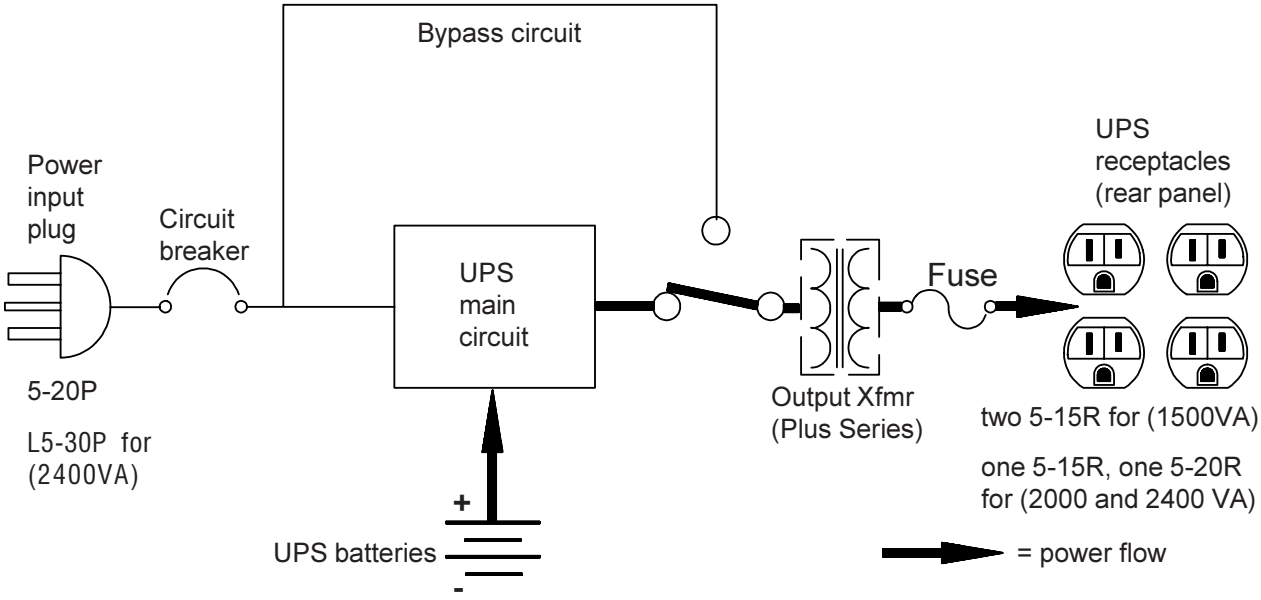
5.0 Operating the UPS

5.1 Operation Modes (Cont'd)

5.1.2 Battery Backup Mode



Power flow in battery backup mode for 600, 800, 1000, and 1200 VA Models



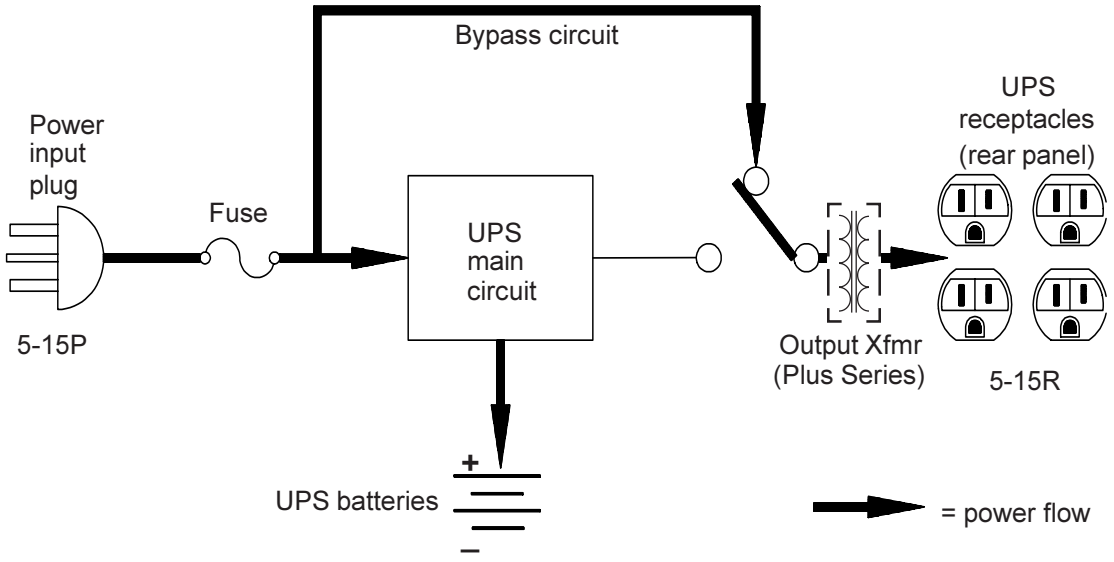
Power flow in battery backup mode for 1500, 2000, and 2400 VA Models

The above illustrations show power flow during the battery backup mode. When commercial ac power failures occur, the UPS's batteries instantly begin supplying dc voltage to the UPS's main inverter circuit. This circuit changes (inverts) the dc power into ac power. The ac power is available at the unit's output receptacles. This back-up process will continue until the UPS's battery voltage drops below a specific minimum level. When this occurs, the batteries will stop supplying power to the load. This minimum level is the rated minimum voltage (Vmin). The rated battery voltage chart on page 5-6 (See Section 5.4 for battery backup time) shows (Vmin). On the front panel, LED's labeled "AC LINE" and "FAULT" should be off. The "INVERTER" LED should be on (See Section 9.5 or 9.6 Panel Layout).

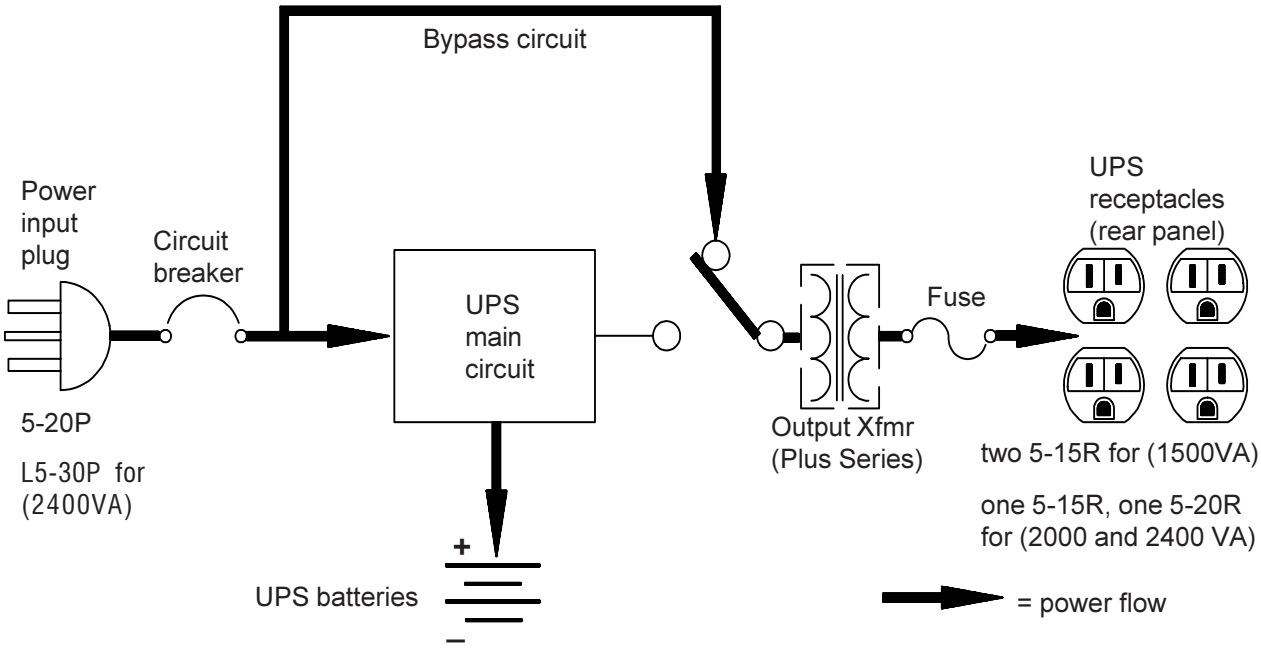
5.0 Operating the UPS

5.1 Operation Modes (Cont'd)

5.1.3 Circuit-bypass Mode



Power flow in circuit-bypass mode for 600, 800, 1000, and 1200 VA Models



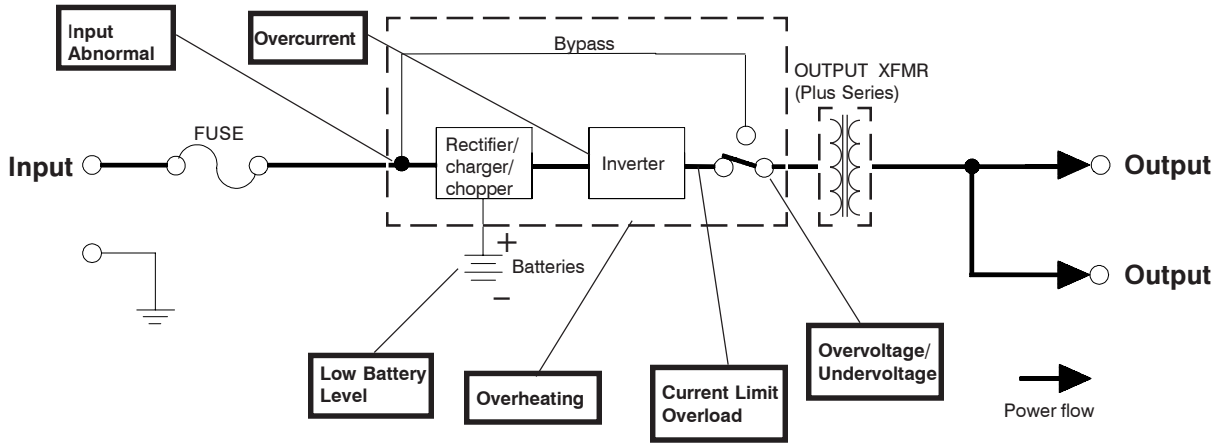
Power flow in circuit-bypass mode for 1500, 2000, and 2400 VA Models

If the UPS unit is overloaded or develops an internal fault, the power flow is automatically switched from the unit's main circuit to the bypass circuit mode. Power flow through the bypass is shown in the above illustrations. This change-over occurs automatically in approximately 4 milliseconds. The switching period is not long enough to cause interruptions to occur in most UPS equipment loads. ***The energy flow must be transferred manually from the UPS's bypass circuit back to the inverter circuit after first correcting the fault.*** Toggle the STOP/RUN switch (on the unit's front panel) first to STOP and then back to RUN. This procedure resets the UPS and transfers back to inverter. On the front panel, the LED labeled "FAULT" should be off. The "INVERTER" LED and "AC LINE" LED should be on (See Section 9.5 or 9.6 Panel Layout).

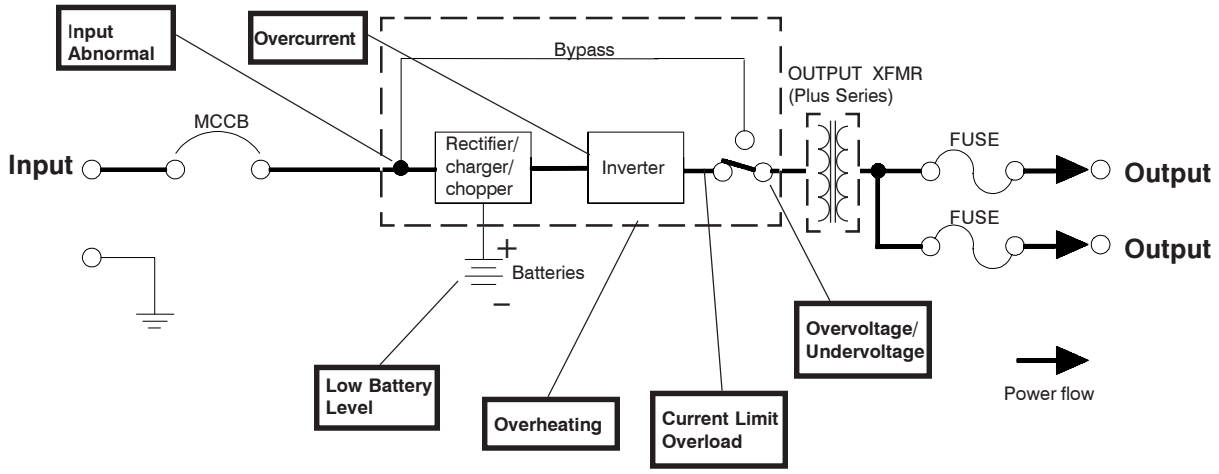
5.0 Operating the UPS

5.2 System Protection Features

The schematic shown below depicts the electrical locations of the protection devices on the 600, 800, 1000, and 1200 VA UPS models.



The schematic shown below depicts the electrical locations of the protection devices on the 1500, 2000, and 2400 VA UPS models.



Note:

The two UPS rear panel output receptacles are supplied from the UPS inverter section through separate 15A output fuses (**applies to the 1500, 2000, and 2400 VA models only**). Thus, an overload on one of the receptacle sets can cause a loss of power to it while the other receptacle set remains active. If all of the UPS indicator lights appear normal and power is not available at one of the receptacle sets, check the associated output fuse.

5.0 Operating the UPS

5.3 Operation Monitoring

5.3.1 Visual Indicator Functions

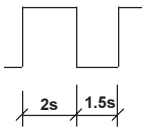
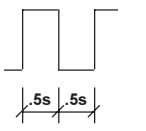
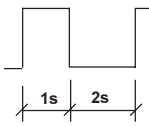
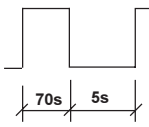
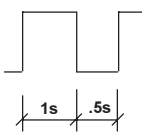
The following LED (light emitting diode) indicators are located on the front panel (see Section 9.5 "Panel Layout" or Section 9.6 "Panel Layout Rack mounted"). Refer to these lamps for visual information about the operating condition of the UPS (see Section 5.3.3 "Visual and Audible Indicator Function Chart").

1) **AC LINE**: This green LED lights when normal ac input power is being supplied to the UPS unit.
2) I**NVERTER**: This green LED lights when the inverter output voltage is normal.
3) **FAULT**: This red LED lights when an abnormal operating condition is detected. Operation of the unit's inverter is inhibited until the fault has been corrected and the system reset (see Section 5.10 "System Reset").

5.3.2 Audible Alarm Functions

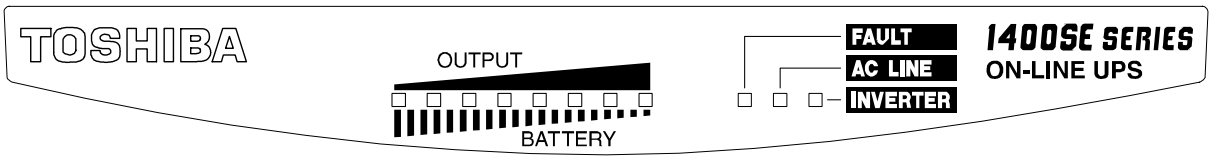
The UPS is equipped with an audible alarm system which activates under various operating conditions. Sound patterns are used to indicate these conditions (see Section 5.3.3 "Visual and Audible Indicator Function Chart"). Alarms for the battery backup mode or low battery voltage will stop automatically when AC input voltage is restored. Alarms for a fault condition will continue to sound until the UPS has been reset (see Section 5.10 "System Reset").

5.3.3 Visual and Audible Indicator Function Chart

Condition	Cause	Audible Alarm Pattern	Visual Indicators	UPS Operation
Overcurrent (OC)	Problem in chopper or inverter circuit.		1) "Fault" LED is **ON** 2) "Inverter" LED is **OFF** 3) "AC Line" LED is **ON**	1) Auto transfer to bypass 2) Chopper stopped 3) Inverter stopped
DC Bus Overvoltage (DCOV)	Vout > 115% of rated.			
Ouput Overvoltage (OV)	Vout > 110% of rated.			
Undervoltage (UV)	Vout < 85% of rated.			
Overheat (OH)	Heatsink exceeds 90º C.			
Overload (OL)	Output current and over-load specifications have been exceeded.			
Battery problem	Problem in battery circuit.			
Normal battery backup operation	Loss of AC power		1) "Fault" LED is **OFF** 2) "Inverter" LED is **ON** 3) "AC Line" LED is **OFF**	1) Chopper running 2) Inverter running
Low battery voltage (voltage less than 90%)	Battery voltage too low.			

5.0 Operating the UPS

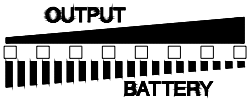
5.4 Front Panel Layout



AC LINE AC LINE (green lamp)
Lights ***green*** when normal ac input power is being supplied to the UPS Unit.

INVERTER INVERTER (green lamp)
Lights ***green*** when the UPS unit is operating in the run mode and the output is normal.

FAULT FAULT (red lamp)
Lights ***red*** when the UPS unit has tripped in the fault mode.

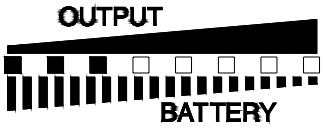
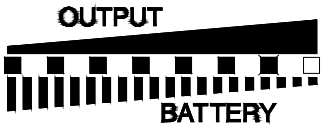
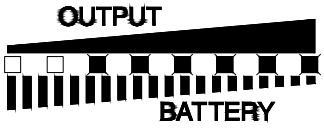
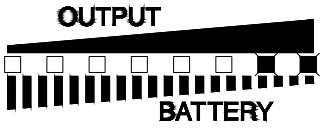


OUTPUT/BATTERY (green/red lamp level meter)
The UPS unit's level meter consists of six green and two red LED lamps

5.5 UPS Inverter Mode Display

The following chart shows normal operating conditions when the UPS INVERTER lamp is ***green***.

UPS Run Mode Display Chart

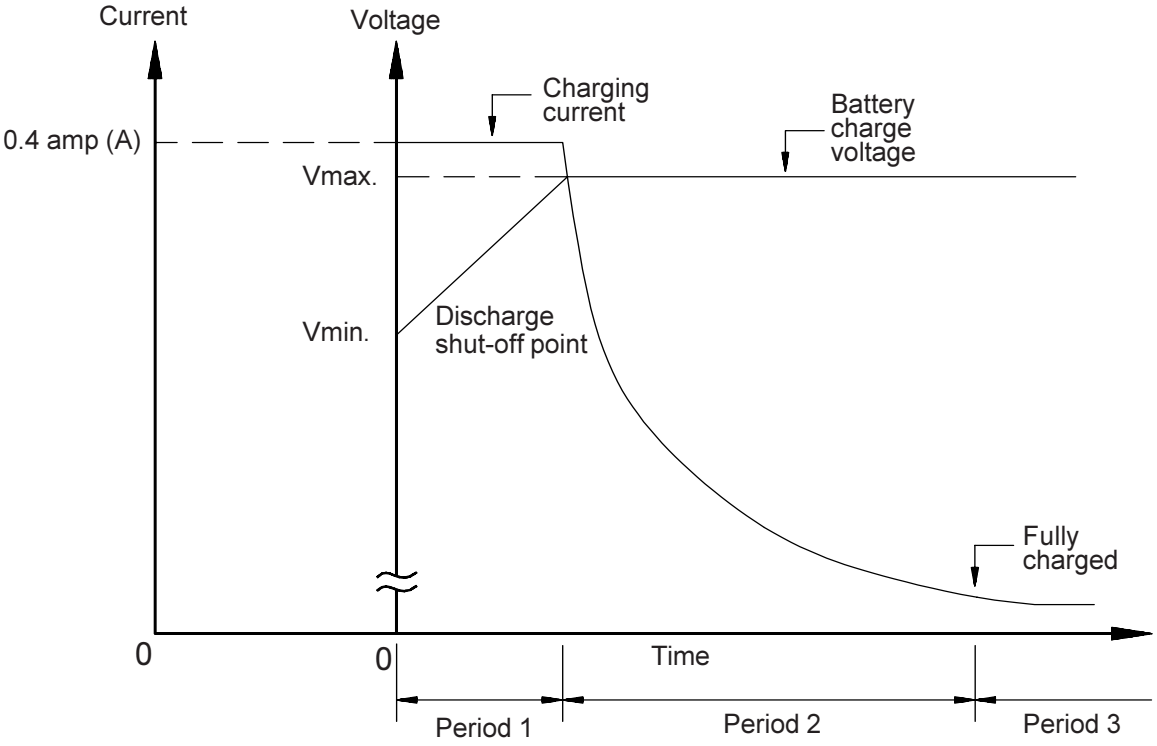
Output	Display status	Explanation
Normal		When output current is between 30% and 100%, the ***green*** lamps light in 15% increments (from left to right) to indicate relative output value (This sample display shows a value level of approximately 45% to 60% of available output current).
Overload		All ***green*** lamps light and one or two ***red*** lamps flash once per second. ***Remove overload as quickly as possible to prevent fault (fault timeouts vary depending on overload condition).***
Battery backup		During battery backup all ***green*** and all ***red*** lamps flash once per second. As the batteries discharge, the green lamps extinguish from left to right to indicate remaining battery capacity (This sample display shows a value level of approximately 55% to 70% of available battery capacity).
Low battery during battery backup		All green lamps are off and one or two ***red*** lamps continue to flash.

= Flashing LED = Steady-lit LED

5.0 Operating the UPS (Cont'd)

5.6 Battery Recharging

The graph below shows the typical voltage requirements for recharging the UPS unit's batteries.



The recharge process usually consists of three periods. During the first period, the current is maintained at approximately 0.4 amperes. In the second period, the constant-voltage control starts and the current gradually decreases as the batteries continue to charge. In the third period, a slight current flows into the batteries to keep them fully charged. After a complete discharge, a full recharge usually requires 24 hours (90% recharge in 8 hours).

The chart depicted below shows the rated maximum and minimum battery voltages, and the charge current for each of the sizes.

Rated battery voltages

Model	Vmax.	Vmin.	Charge
600 VA / 600 VA Plus	41.4	28.8	0.4 (A)
800 VA / 800 VA Plus	55.2	38.4	0.4 (A)
1000 VA / 1000 VA Plus	55.2	38.4	0.4 (A)
1200 VA	69.0	48.0	0.4 (A)
1500 VA / 1500 VA Plus*	82.8	57.6	0.4 (A)
2000 VA**	110.4	76.8	0.4 (A)
2400 VA	110.4	76.8	0.4 (A)

* Includes 2000 VA rack mounted unit, UC1A1A020C6RKB

** Except 2000 VA rack mounted unit, UC1A1A020C6RKB

5.0 Operating the UPS

5.7 Battery Backup Time

The UPS unit's batteries provide about 10 minutes of back-up time for the 600 through 2400 VA capacity units. These times are valid when the unit is operating under full load. When the units are operating at half load, the batteries can power the load equipment about 3 times longer. The exact length of these times will depend on the UPS model used, condition of the batteries, amount of load, temperature and other variables. See battery backup time in the standard specifications Sections 4.1 through 4.3.

5.8 Battery Low Voltage Tolerances

Excessive discharge will cause the UPS unit's battery voltage to drop. The chart shown below lists the voltage level at which each UPS unit's low-voltage alarm will sound and also at what level the low-voltage condition will cause the unit to automatically shut down.

UPS Capacity in VA	600	800	1000	1200	1500*	2000**	2400	600+	800+	1000+	1500+
Nominal voltage in Vdc	36	48	48	60	72	96	96	36	48	48	72
Alarm voltage in Vdc	31.7	42.3	42.3	52.8	63.4	84.5	84.5	31.7	42.3	42.3	63.4
Shutdown voltage	28.8	38.4	38.4	48	57.6	76.8	76.8	28.8	38.4	38.4	57.6

* includes UC1A1A020C6RK

** except UC1A1A020C6RK

5.9 Battery Check Function

Part of the UPS start-up procedure is an automatic 'Battery Check' to see if a problem exists in the battery circuit. When the UPS is started it will begin operation in the bypass mode. An automatic voltage level test of the batteries is made while operating in the bypass mode for 5 seconds. A failure of this first test will activate visual and audible alarms (see section 5.3.3 "battery problem"). If this test is passed, then the UPS will auto-transfer from bypass mode to inverter operating mode. A 10 second automatic voltage check of the batteries is made after the UPS has auto-transferred from bypass to inverter mode. Normal inverter operation continues if the second test is passed. If the second test fails, then the "Fault" LED will flash and up too three additional automatic battery voltage checks are made at 3 hour intervals while the inverter continues to operate. If the batteries are found to be normal during one of these three tests then the "Fault" LED will stop flashing and normal inverter operation will continue. A failure of the third and final check will activate visual and audible alarms (see section 5.3.3 "battery problem") causing an auto-transfer back to bypass. ***If the batteries are indicated "bad" then STOP the UPS and allow a 24 hour charge on the batteries before restarting.***

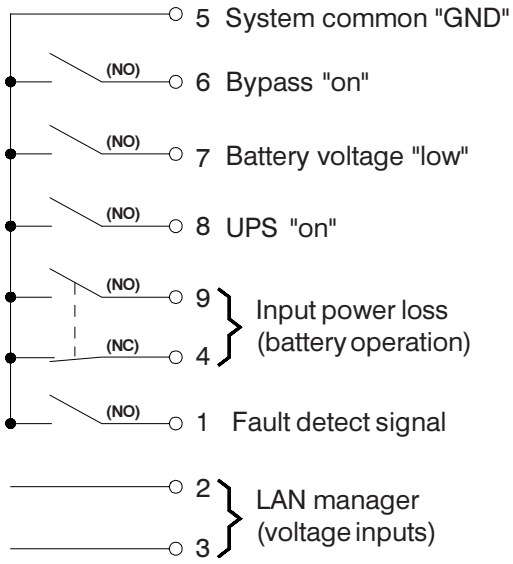
5.10 System Reset

The UPS is reset by moving the STOP/RUN switch from "run" to "stop" and then back to "run". Use the reset procedure to transfer from bypass back to inverter after a fault occurs. Some faults may only be cleared by shutting down the UPS, waiting for all LED's on the front panel to go off, and then restarting the UPS.

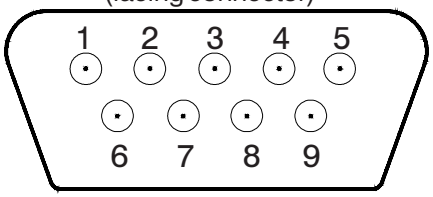
6.0 UPS Control Interface

6.1 Remote Contact and IBM AS/400

The AS/400 interface is a standard feature and is available as dry switch contacts through a DB9 male connector located on the back side of the UPS (see Section 9.1, 9.2 or 9.3). The AS/400 interface uses standard pins numbered 5 through 9. Pins numbered 1 through 4 are also assigned for usage in addition to AS/400. The following schematic shows the contact state and pin assignment for each signal output along with the associated DB9 connector pinout.



DB9 Male Connector Outline
(facing connector)



Notes:

1) Pin "switches" are shown in their ***inactive states*** (ex: if battery voltage is low then pin 7 will be connected to pin 5 common "GND").

2) Contacts are rated as follows:

dc: 48V, 0.1A
ac: 30Vrms (42V-peak), 0.07A (0.1A-peak)

6.0 UPS Control Interface

6.2 RS-232C Communication Interface

The RS-232C serial communication interface is a standard feature and is available through a DB9 female connector located on the back side of the UPS (see Section 9.1, 9.2 or 9.3). This interface allows control of the UPS from a personal computer running special Toshiba software. The computer is connected to the UPS through a serial RS-232C communication port. The available data from the UPS, via the RS-232C communication link, is shown below:

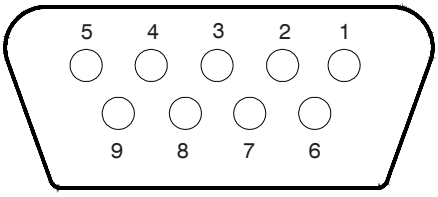
Operating conditions	Output voltage Output current Battery voltage Input frequency Output frequency
UPS operating status (described as 'yes' or 'no')	Utility power OK Low battery voltage detected UPS in BYPASS mode UPS in NORMAL mode Input and output frequency synchronized UPS 'fault' occurred
'Fault' details (described as 'occurred' or 'not occurred')	DC bus overcurrent DC bus overvoltage DC bus undervoltage Input overcurrent Overheat Overload being timed Overload (allowable time exceeded) Output overvoltage (during NORMAL mode) Output undervoltage (during NORMAL mode)

The connector pin assignment and female connector outline are illustrated below.

RS-232C Connector Pin Assignment

Pin	I/O	Symbol	Description
1	This pin is not used		
2	Input	RXD	Receive data
3	Output	TXD	Transmit data
4	Output	DTR	Data terminal ready
5	——	SG	Signal ground
6	Input	DSR	Data set ready
7	Output	RTS	Request to send
8	Input	CTS	Clear to send
9	This pin is not used		

DB9 Female Connector Outline
(facing connector)



6.2.1 UPS Shutdown (via RS-232C)

When the UPS is operating from its internal batteries, a 'shutdown' order can be sent to the UPS telling it to turn OFF after a user-specified amount of time. This function can allow you to stop discharging the UPS batteries after an orderly system shutdown has been completed. The UPS can be programmed to turn OFF up to 8 minutes after the 'shutdown' command is given. This command can be cancelled before the specified time has elapsed.

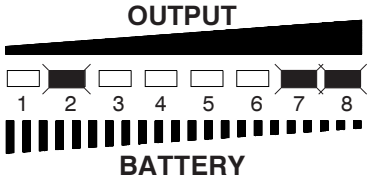
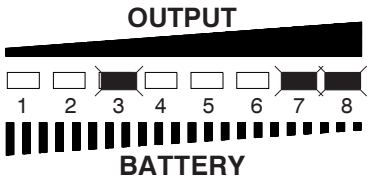
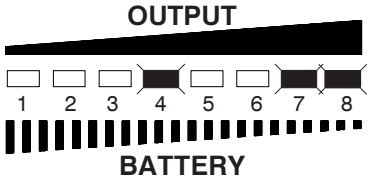
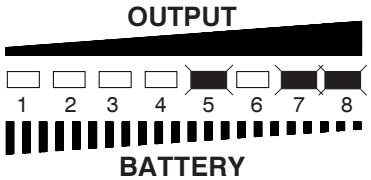
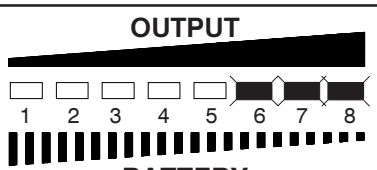
7.0 Troubleshooting Procedures

Faults are those abnormal conditions that can occur and can cause the unit to shutdown normal operation. The faults are detected by the protection circuitry (see System Protection Features Section 5.2) in the unit. The UPS FAULT lamp will light ***red***. "Troubleshooting" involves monitoring the OUTPUT/BATTERY level meter lamps on the front panel and then interpreting the readout by using the fault mode display charts.

7.1 Non-Fatal Fault Mode

Non-fatal faults may or may not cause the unit to shut down; they normally will cause the UPS to transfer to bypass mode. Use "System Restart" procedures (see Section 5.10). Use the following chart to decode the display.

Non-Fatal Fault Mode Display Chart

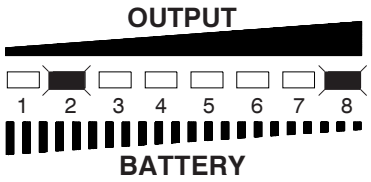
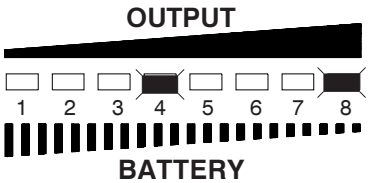
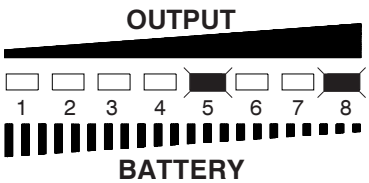
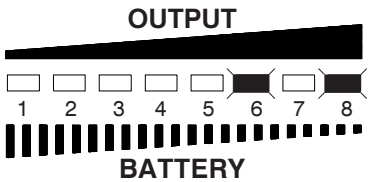
Fault	Display status	Probable cause	Corrective action
Output low voltage	 Red and Green LED's flash alternately	Inverter fault or short circuit in UPS output	Remove cause of short circuit. If none is found, contact your Toshiba service representative.
Output overvoltage	 Red and Green LED's flash alternately	Resonance with load equipment	Remove load equipment one piece at a time.
DC undervoltage	 Red and Green LED's flash alternately	Chopper fault	Contact your Toshiba service representative
Cooling fin overheating	 Red and Green LED's flash alternately	Cooling fan outage or closed cooling airflow path	Check for airflow restriction.If none is found, contact your Toshiba service representative.
Battery problem	 Red and Green LED's flash alternately	Battery damaged or something wrong in the battery circuit (battery not connected)	Contact your Toshiba service representative

7.0 Troubleshooting Procedures

7.2 Fatal Fault Mode

Fatal faults may or may not cause the UPS to shutdown. Use "System Reset" procedures (see Section 5.10). Use the following chart to decode the display.

Fatal Fault Mode Display Chart

Fault	Display status	Probable cause	Corrective action
DC overcurrent	 Red and Green LED's flash alternately	Inverter fault	Contact your Toshiba service representative.
DC overvoltage	 Red and Green LED's flash alternately	Chopper fault	
Input overcurrent	 Red and Green LED's flash alternately	Chopper fault	
UPS system error	 Red and Green LED's flash alternately	Trouble with the control PWB	Contact your Toshiba service representative.

= Flashing LED

8.0 Preventive and Scheduled Maintenance/Parts Replacement

8.1 Preventive Maintenance

Toshiba's 1400SE Plus Series of uninterruptible power systems have been designed to provide years of trouble-free operation requiring a minimum of preventive maintenance.

The best preventive measure that the UPS user can take is to keep the area around the unit, particularly the air inlet vents, clean and free of moisture and dust accumulations. If the atmosphere of the installation site is very dusty, use a vacuum cleaner to periodically remove dust accumulations from the system. Schedule authorized service centers to perform internal parts inspections annually.

CAUTION **Before performing any maintenance the technician should be familiar with and follow the important safety instructions located on pages vi and vii.**

WARNING Proper maintenance of the battery system of this unit by a qualified service techincian is essential to the safety and reliability of your UPS system. Refer to service manual.

8.2 Parts Replacement

The following list shows intervals for periodic maintenance and replacement of certain UPS parts.

1) Batteries: VRLA batteries are maintenance free with respect to electrolyte only. The charging voltage, temperature, performance and connection resistance must be monitored periodically. Necessary corrective actions must be made in order to assure safe reliable power is supplied by the UPS. The aforementioned items affect the life of batteries, so replacement should be done once every 3 to 5 years at a minimum. All of the batteries must be replaced at the same time.

   Quarterly maintenance
   a) Visual checks
      1) Leakage
      2) Corrosion on positive terminal
   b) Check battery temperature at the negative terminal.
   c) Measure and record the system float charging voltage.
   d) Measure and record the individual units float charging voltage.

   Semi-Annual maintenance
   a) Repeat the quarterly checks.
   b) Perform a 10 second high rate (e.g. 100 amp) load test on the individual batteries.
   c) Optionally test for the purpose of trending the battery over time.
   d) Re-torque all inter-battery connecting hardware (if applicable).
   e) Perform inter-battery connector resistance checks.

2) Aluminum electrolytic capacitors: Replace once every 5 years.

3) Fuses: Replace once every 7 years (see output fuse rating chart below).

4) Cooling fan: Replace once every 3 years.

8.0 Preventive and Scheduled Maintenance/Parts Replacement

8.3 Input/Output Fuse Rating Chart

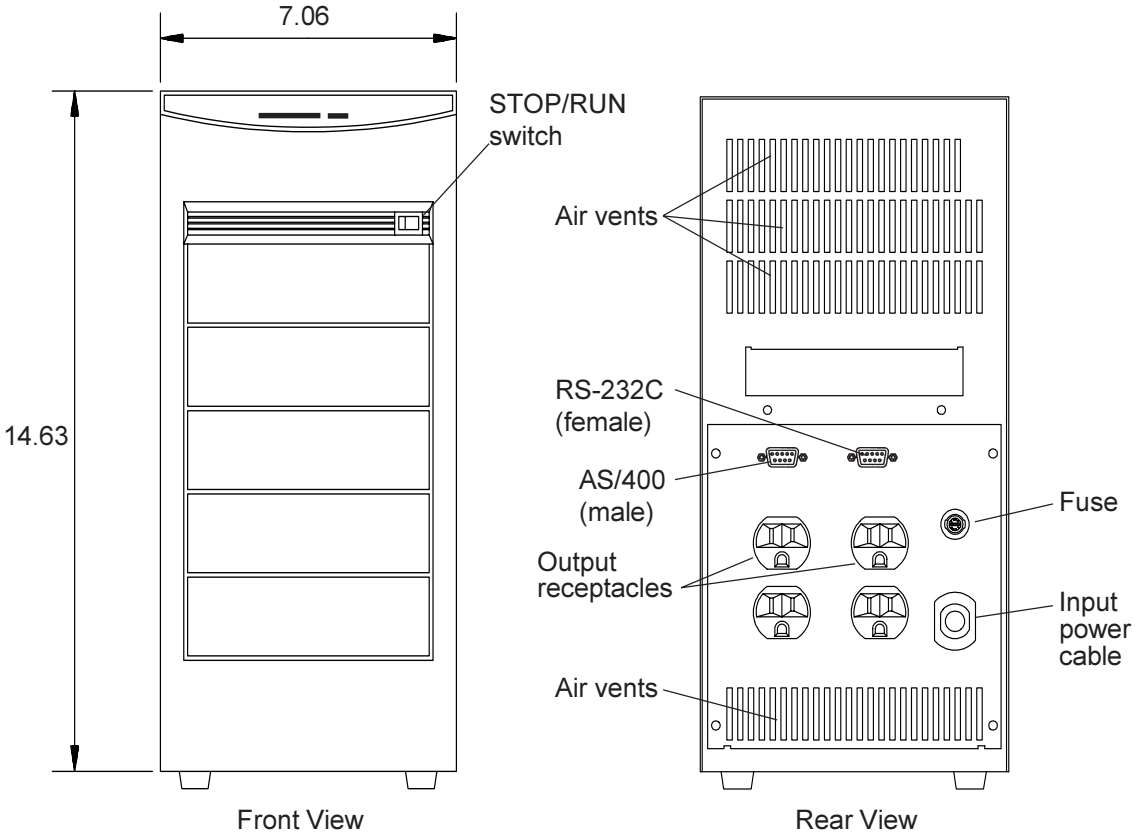
The following chart shows the recommended fuses for all UPS sizes.

Fuse rating

Model	Amp rating	Fuse model no.
600 VA	15.0A	LittleFuse 314015
800 VA	15.0A	LittleFuse 314015
1000 VA	15.0A	LittleFuse 314015
1200 VA	15.0A	LittleFuse 314015
1500 VA	15.0A	LittleFuse 314015
2000 VA	15.0A	LittleFuse 314015
2400 VA	15.0A	LittleFuse 314015
600 VA Plus	6.25A	Bussman MDL-6.25
800 VA Plus	8.0A	Bussman MDL-8
1000 VA Plus	10.0A	Bussman MDA-10
1500 VA Plus	15.0A	LittleFuse 314015

9.0 External Dimensions/Shipping Weights/Panel Layout

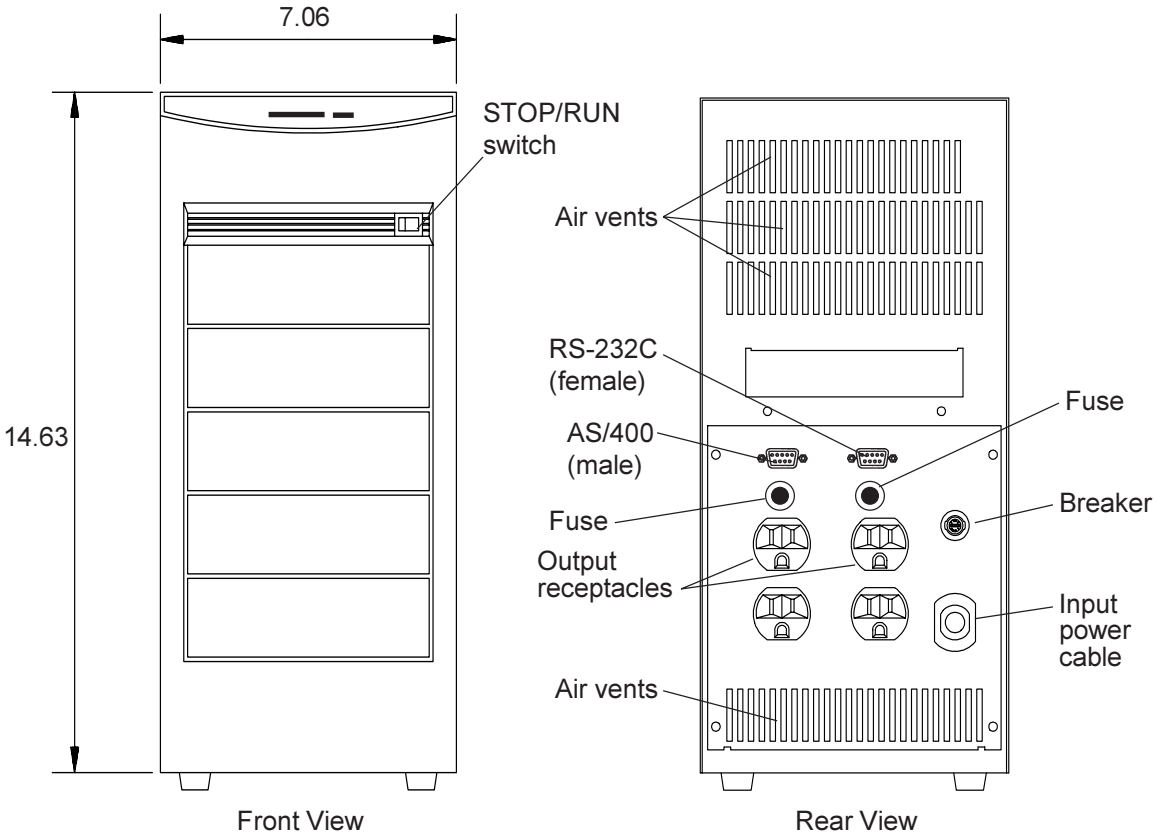
9.1 External Dimensions for 600 through 1200 VA Models

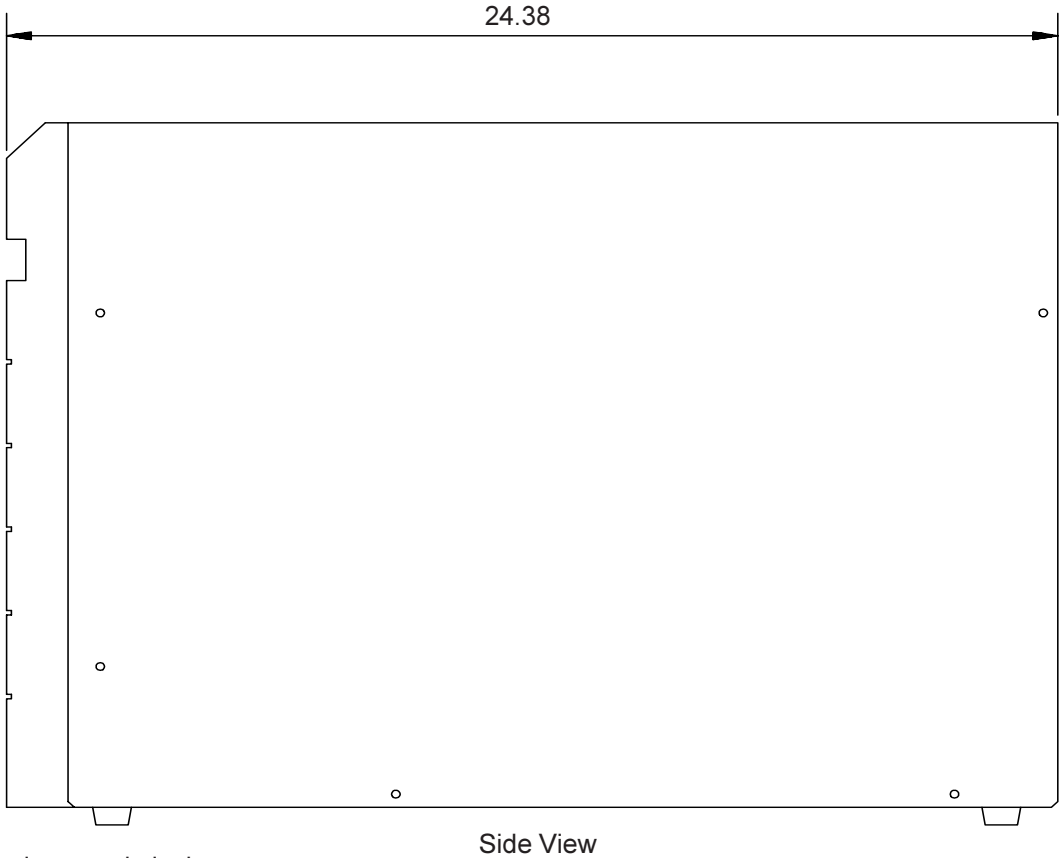


Dimensions are in inches

9.0 External Dimensions/Shipping Weights/Panel Layout

9.2 External Dimensions for 1500 through 2400 VA Models

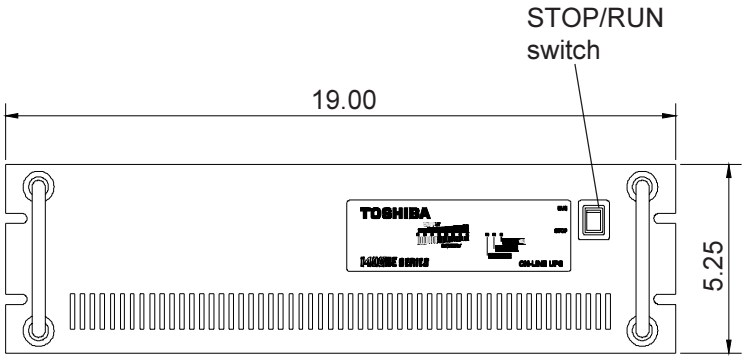




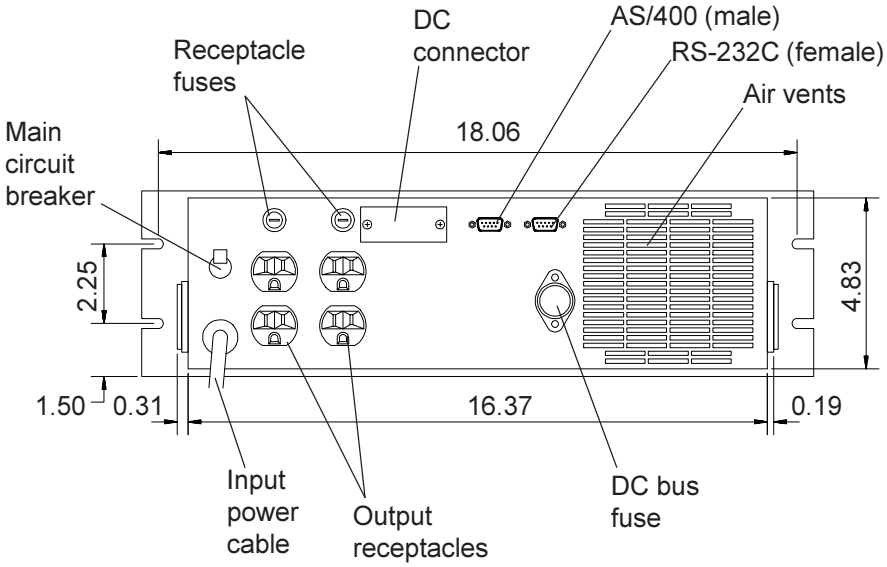
Dimensions are in inches

9.0 External Dimensions/Panel Layout/Shipping Weights

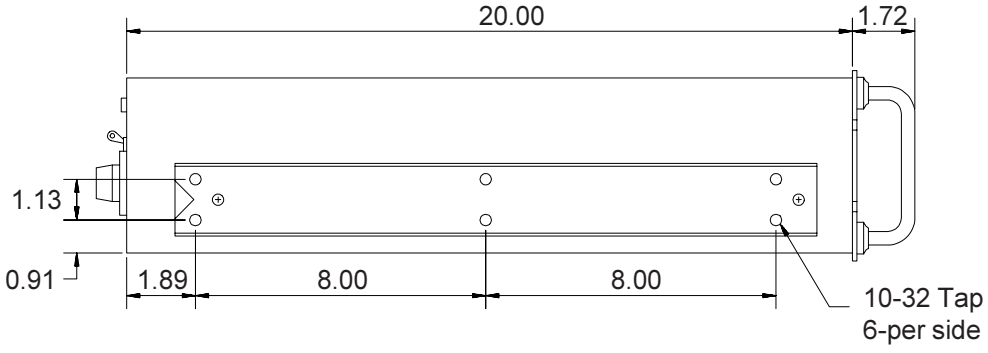
9.3 External Dimensions for 1500 and 2000 VA Model (Rack Mounted)



Front View



Rear View



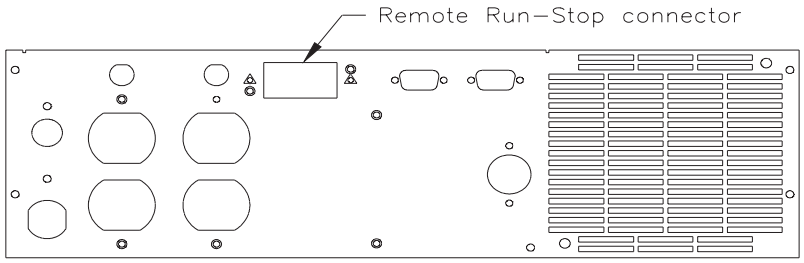
Side View

Dimensions are in inches

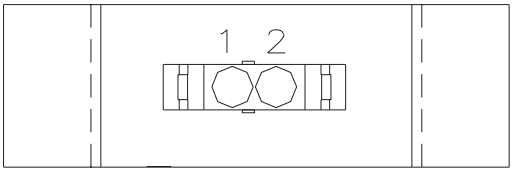
9.0 External Dimensions/Panel Layout/Shipping Weights

9.4 Remote Run/Stop

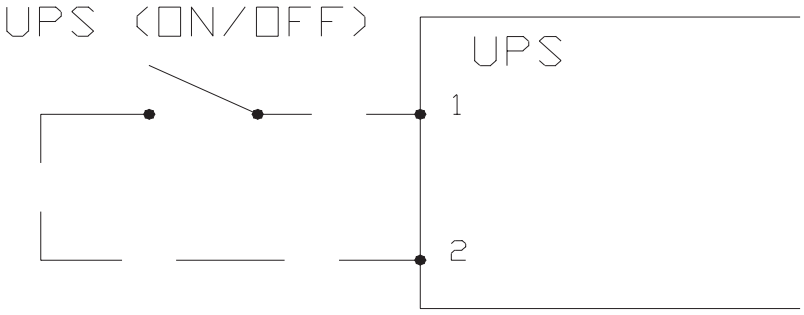
Toshiba UPS models UC1A1A015C6RKP and UC1A1A020C6RKB have a Remote Run Stop connector located on the rear panel of the UPS. This connector allows the UPS to be switched from bypass to on-line via a remote source.



Below is a detailed view of the connector assembly.



The connector is a normally open contact and must be closed to activate.
When open, the UPS is in bypass mode.
When closed, the UPS is on-line.



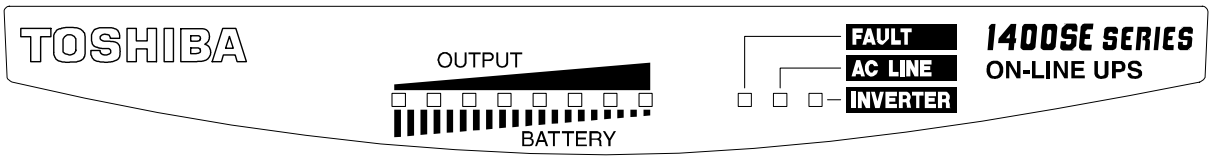
Recommended external cable length should not exceed 10 meters max.

CAUTION: To prevent malfunctions due to noise, use a shielded type cable.

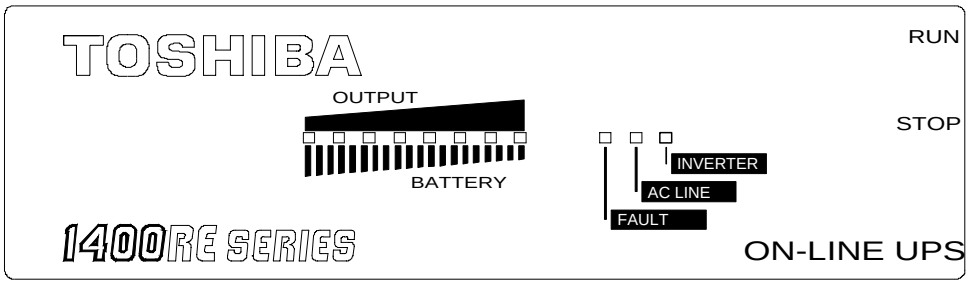
ATTENTION: The Remote Run Stop function is only available when the front panel run switch is in the run position. Also during under voltage you can stop but not restart.

9.0 External Dimensions/Panel Layout/Shipping Weights

9.5 Panel Layout



9.6 Panel Layout (Rack mounted)



9.7 Shipping Weights

UPS	Shipping Weight	
Model	Pounds	Kilograms
600 VA	60	27.2
800 VA	66	29.9
1000 VA	70	31.8
1200 VA	76	34.5
1500 VA	96	43.6
2000 VA	106	48.2
2400 VA	106	48.2
600 VA Plus	80	36.4
800 VA Plus	85	38.6
1000 VA Plus	92	41.8
1500 VA Plus	117	53.2
1500VA Rack	81	36.7
2000VA Rack	81	36.7

TOSHIBA

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